

## **Electric Vehicle Readiness Plan**

Electric vehicles (EV's) are quickly expanding in California. Improved battery technology, range, more competitive cost compared to gas cars, incentives and legislation have all led EV's into the mainstream car market. Recently, Governor Newsom signed an executive order to require that all new passenger cars sold in California be zero-emission vehicles by 2035 making it the first state in the U.S. to do so. However, many cities are not ready for this massive shift to electric vehicles yet play a crucial role in helping to expand EV infrastructure and support policies that help the transition. While the state of California has made tremendous strides reducing CO2 from power plants with a major pivot to renewable energy, the same can't be said for the transportation sector which represents approximately 40% of California's overall emissions. California will be unable to meet its state climate and air quality goals without a major shift to zero emission vehicles. Although deploying EV chargers can be a complex process with many different stakeholders, the Electric Vehicle Readiness Plan (EVRP) provides California city planners with information to assist them in expanding critically needed EV infrastructure. EVRP serves as a guide to understanding the EV market, basics of EV charging, incentives, legislation, potential project partners, and also makes specific recommendations for cities to expand EV infrastructure to make EV charging more accessible now and for future EV drivers in cities across California.

## The Problem

Although electric vehicles are coming, too many California cities are not yet prepared for this transition yet play a significant role in the deployment of critical EV infrastructure that will ultimately charge electric vehicles. From a policy perspective, there are over 250 cities or counties in California that have not implemented California laws like Assembly Bill 1236 (AB1236) which established new requirements to streamline permitting for electric vehicle charging stations (Business.ca.gov). Not implementing AB1236 means EV project developers don't have permitting consistencies throughout the state and can face long and unreasonable permitting review times which will delay the construction of EV projects. Secondly, cities are just not taking action to develop EV projects. Some cities are not considering EV infrastructure a high priority or appear to be taking a wait and see approach. Regardless, the cars are coming, there are incentives and rebates now if cities choose to own EV chargers or cities can have third parties install chargers at no cost. Additionally, the longer cities wait, the more difficult it may be to get power from the utilities as fleets, city transit agencies, and school districts are all poised to shift to electric creating potential strain on electricity providers for some locations.

## Audience

The audience for the EVRP is California city planners who have not yet acted to expand EV infrastructure in its city or county. While Covid-19 has devastated city tax revenue and led to furloughs and layoffs, city staff has less resources to focus on things like EV infrastructure. While there is information for cities to reference with regards to EV infrastructure, few tools offer a more comprehensive guide that includes policy recommendations.

## My Project and Journey

I live in Los Angeles, ranked as having the worst air pollution in the U.S. year after year. I feel so lucky to live in a place that is so diverse with beaches, mountains, and city life, but the air pollution bothers me and most of it is due to transportation. My interest in renewable energy and electric vehicles started about twelve years ago when I made a major mid-life career change. I was itching to do something totally different in my career after about 10 years of television advertising sales. I started doing volunteer work for Environment California, an environmental

advocacy group. I liked it so much that I wanted to pursue a career in an environmentally focused field, so I decided to work for a solar panel installation company. That decision really paid off and I've gone on to work at innovative companies on the front lines of greenhouse gas reduction in California like SolarCity, EVgo, Tesla and now Electrify America. It's exciting to know that renewable energy, electric vehicles, and electric vehicle infrastructure are not only contributing to greenhouse gas reduction and improving air quality, but are also creating jobs. Living in Los Angeles, it's hard to avoid seeing our air pollution. I'm dedicated to changing that and I am on a mission to see that EV chargers are deployed, and in a much faster manner. I leased my first all-electric vehicle (EV) in November of 2017. I was thrilled to be driving an EV but I live in an apartment and I don't have a garage and therefore I was forced to rely on public electric vehicle infrastructure. The novelty and excitement of driving an EV wore off quickly as I had to navigate the hassle, inconvenience, and sometimes unreliable, public EV chargers. I started to think about ideas for how I can help cities to deploy more EV chargers.

My initial project was to create an Electric Vehicle Strategy plan for the City of San Fernando. However, when Covid-19 hit, this strategy plan was scrapped as I realized there would not be enough time to implement the plan. I did, however, have a helpful interview with the Director of Economic Development, Tim Hou, of the City of San Fernando. Like many cities, the City of San Fernando has suffered a major plunge in sales tax revenue since Covid-19 began. When I asked if he thought the city was ready for EV's, he said the city has EV chargers, but needs to add more particularly with Governor Newsom's recent announcement. I also asked if he thought that the EVRP would be beneficial to small cities, he responded, "Absolutely, especially now when city staffs have faced major furloughs and layoffs. If I could have a comprehensive EV planning tool to reference, I think that would be quite helpful."

## Benefits of EV's

Why do we need a massive shift to electric vehicles? Electric vehicles reduce greenhouse gas emissions, improve health, create jobs, and reduce inequity. California leads the nation in EV adoption and also EV jobs. It is estimated that the EV industry employs more than 275,000 in California including over 20 manufacturing sites. Electric bus manufacturers, Proterra and BYD, as well as Tesla's auto manufacturing plant, all produce cars in California for an industry with average salaries of \$80,000 to \$90,000 per year (The 4<sup>th</sup> Revolution, 2018).

Transitioning to ZEV's will go a long way to reducing CO2 emissions and overall health impacts. It is estimated that nearly half of all Americans live in counties affected by poor air pollution which contributes to asthma, respiratory, and cardiovascular health. And much like we are seeing with the Covid-19 virus pandemic, harmful air pollution disproportionately impacts minority communities. According to a recent study by the Union of Concerned Scientists African Americans and Latinos are exposed to 40% more particulate matter than white Californians (Boyd-Barrett, 2019). Meanwhile, a massive shift to zero-emission vehicles "could add up to \$72 billion in avoided health harms, saving approximately 6,300 lives and avoiding more than 93,000 asthma attacks annually in 2050 (American Lung Association, 2019).

## Outline

Title: Electric Vehicle Readiness Plan

### I. Introduction

Electric vehicles (EV) are quickly expanding in California and this trend will continue as Governor Newsom recently signed an executive order that requires all new passenger cars and trucks sold in California to zero-emission by 2035.

- A) Executive Summary
- B) Problem: Many California cities are not prepared for the coming EV market.
- C) Audience: California City Planners
- D) Benefits of EV's: reduced greenhouse gas emissions, improved health, and economic benefits (job growth).
- E) Legislation Summary: California's AB32 – Climate Change legislation, zero emission vehicle (ZEV) mandate.
- F) Overview of the EV market: Tesla dominates the market (for now), but many other auto manufacturers are ready to launch EV's.

### II. Electric Vehicle Readiness Plan

Cities need to be ready for this massive shift to EV's and will play a crucial role in helping to expand EV infrastructure and support policies to help the transition. The Electric Vehicle

Readiness Plan (EVRP) provides cities with information to help expand critically needed EV infrastructure.

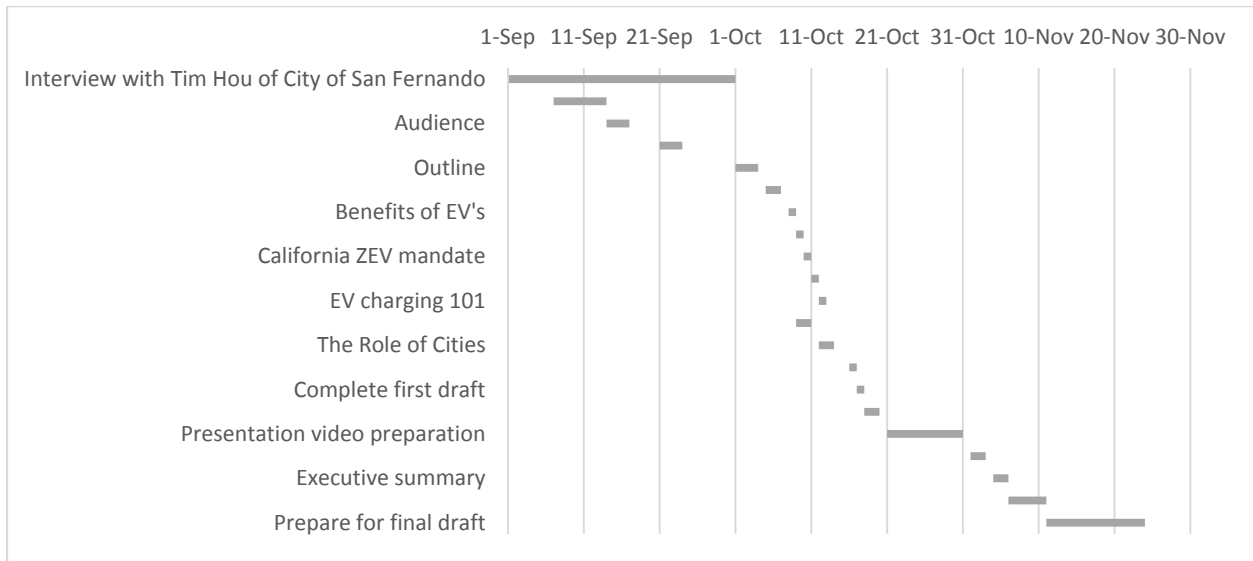
- A) Basics of EV charging: charging speeds, types of connectors, and home versus public and highway charging.
- B) Understanding the incentive programs: what incentives are available for cities and individuals: rebates, tax credits and grants?
- C) Identifying potential project partners: do cities try to add EV infrastructure on its own or look to the private sector to do so?
- D) Policy recommendations: how can cities facilitate EV infrastructure development?

### III. Conclusion

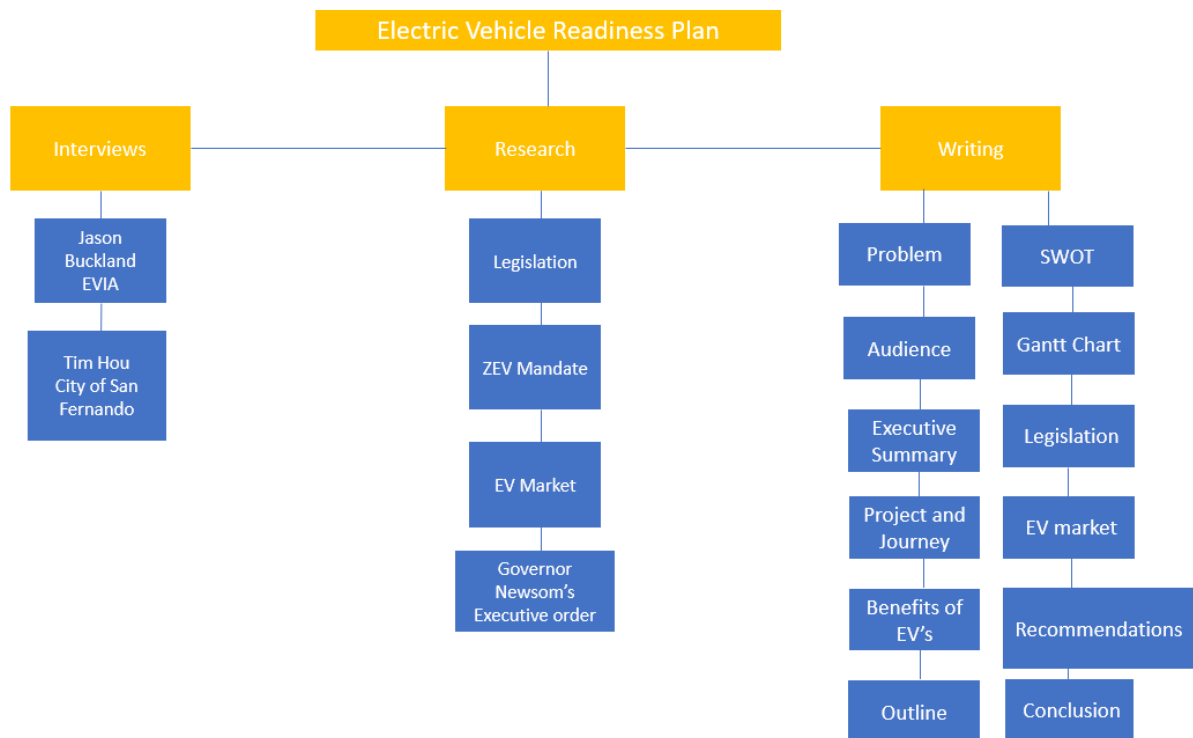
## SWOT

Strengths	Weakness
<ul style="list-style-type: none"> <li>• EV market is expanding quickly</li> <li>• Cities play a vital role in expanding EV infrastructure</li> <li>• Cities need a comprehensive plan to expand infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Cities feel they don't need a tool like the EVRP and also take a wait and see approach to adding EV infrastructure</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>• Covid-19 and city's inability to devote resources to EV infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Covid-19 has devastated city tax revenue potentially delaying action EV infrastructure</li> </ul>

## Gantt Chart



## Work Breakout Schedule



It's important that cities are aware of legislation related to CO2 emissions from transportation such as Assembly 32 (AB32) or California's climate action bill, zero emissions vehicle (ZEV) mandate and Governor Newsom's recent executive order zero emission vehicles.

## Legislation (AB32)

Signed into law in 2006 in California, AB32 – The Global Warming Solutions Act mandates greenhouse gas reduction targets of 80% below 1990 levels by 2020. California utilities are well ahead of the state mandate of 33% renewable energy by 2020, but emissions are rising from the transportation sector which was already the largest source of greenhouse gas emissions (Barboza and Lange, 2018). Emissions reduction in California must also come from the transportation sector in order to comply with the Global Warming Solutions Act of 2006, or Assembly Bill (AB) 32. Local governments play an important role in the implementation of AB32 which mandates greenhouse reduction targets of an 80% reduction below 1990 levels by 2050. Some of the ways cities and counties are transitioning to a low carbon future and compliance with AB32 include improving their municipal operations by upgrading their fleets to zero emission vehicles, retrofitting government buildings and streetlights to become more energy efficient, adding EV chargers, on-site renewable energy, purchasing greener products, implementing waste-reduction policies, and more. In addition, cities are adopting more sustainable building codes, standards, and general plan improvements to reduce their community's emissions. Many of these activities also can help to create more sustainable communities.

## California ZEV Mandate

California's zero emissions vehicle (ZEV) program calls for 1.5 million zero emission vehicles on the road by 2025 and 5 million by 2030. There are a variety of programs to help reach this goal including a state rebate program with up to \$4,500 for battery electric vehicles. There is also a federal tax credit of up to \$7,500 and local utility rebates. The incentives are clearly spurring adoption and in July of 2018, California reached over 410,000 ZEV's sold in the state (ZEV Action Plan, 2018). California green building code (CAL green) also requires new residential new multi-family buildings to have a dedicated 40 amp circuit for EV charging in 10% of total parking space and that percentage scales up in future years (CSE.com, 2018). But more needs to be done to reach 1.5 million ZEV's or one out of six new car purchases by 2025

including adding more public EV chargers. According to a recent survey, only 17% of Californians surveyed are aware that the state offers rebates for electric vehicles, not to mention the infrastructure required to own an EV (ZEV Action Plan, 2018). Further engagement at the local level is needed.

## Governor Newsom's Executive order

Governor Newsom recently announced an executive order requiring all new passenger vehicles to be zero-emissions by 2035 to address California's problematic greenhouse gas emissions and harmful air pollution from the transportation sector. "This is the most impactful step our state can take to fight climate change," said Governor Newsom. "For too many decades, we have allowed cars to pollute the air that our children and families breathe. Californians shouldn't have to worry if our cars are giving our kids asthma (CA.GOV, 2020)." The California Air Resources Board (CARB) will develop regulations for this executive order which is expected to reduce greenhouse gas emissions from cars by 35% and improve oxides of nitrogen emissions by 80 percent (CARB, 2020).

## The EV Market

It's also important for cities to understand the EV market. Electric vehicles are expanding at a rapid rate in California, representing 8% of total cars sales in the state in 2018 (CSE.com, 2018). California is clearly the leader in the U.S. EV market with nearly half of all EV sales in the U.S. (Kane, 2020). In fact, according to recent report by Bloomberg New Energy Finance, "EV's are on track to dominate global sales of passenger cars and buses by 2040" (BNEF, 2019). But what's currently driving California's EV market? Tesla's Model 3 has had a major impact on the growth of EV sales particularly in California. Tesla finished in 3<sup>rd</sup> place behind Toyota Camry and Honda Civic as California's best-selling, non-SUV car sales in 2018 (Gaton, 2019). Other manufacturers now have to compete with Tesla in the EV market. While Model 3 has owned the spotlight over the last couple of years, there are more than a dozen EV models available in the U.S. including the Nisan Leaf, Chevy Bolt, Honda Clarity, Audi E Tron, Hyundai Ioniq, Hyundai Kona, Jaguar I-Pace, Kia Niro, Porsche Taycan and many more coming including VW's ID.4, Ford's Mach E and F-150 electric pickup.



## EV charging 101

There are three typical levels of charge available for most EV drivers:

Level 1 (or a standard 110v home outlet) is the easiest way to charge but also the slowest (recharges the car battery at approximately 4 to 6 miles of charge per hour). Level 1 is only feasible if a driver has long dwell times before driving the car again, and the driver does not need the EV for long trips. Level 1 charging is sufficient for a plug-in hybrid-electric (PHEV) which generally have much smaller batteries than BEV's.

Level 2 (a 240v connection) is the most common form of charging and typically requires a 40 amp connection (similar to a home dryer connection) and recharges the car battery at approximately 10 to 30 miles per hour. Level 2 charging is a good solution for home, workplace, and public charging with typical idle times of three to four hours minimum.

Level 3 (referred to as DC fast charging) is the fastest type of EV connection and requires a 480v utility connection, so these chargers are more commonly seen in public shopping centers (malls and grocery stores) and close to highways. Level 3 is able to charge EV's at up to 10 miles per minute depending on the power of the charger. Level 3 chargers are more commonly seen in public shopping centers (malls and grocery stores) and close to highways.

## Types of EV Connectors

Tesla: Tesla has a proprietary connector that only serves Tesla cars.

Combined Charging System (CCS): the most widely supported connector other than Tesla and supports both alternating current (AC) and direct current (DC) charging. The most common auto manufacturers that use CCS: BMW, Ford, Jaguar, GM, Honda, Kia, Mazda, and VW.

CHAdeMO: the Japanese fast charging connection standard. Most common in the Nissan Leaf. CHAdeMO appears to be phasing out in favor of CCS.

J-1772 level 2: the most common and nearly universal level two charger. All non-Tesla EV's come with a J-1772 connector and Tesla has an adapter for it.

## Recommendation: Adopt AB1236

Cities can play an instrumental role in the expansion of EV charging by adopting policies that support EV charging, develop EV infrastructure, coordinate stakeholders and purchase of EV fleet vehicles.

One of the most important things for cities in California to help expand EV infrastructure is by adopting Assembly Bill 1236. Signed in law in 2015, AB1236 requires California cities to streamline permitting for residential and non-residential electric vehicle charging stations. Cities that have adopted AB1236 have an expedited permitting process and protects EV charging developers from unreasonable planning, permitting, and design reviews. The intent is to fast track and provide project developers with consistent city review standards and permit approval for EV projects in California. Jurisdictions are graded on an “electric vehicle charging stations scoreboard” which are posted on the Governor’s Office of Business and Economic Development (Go-Biz), and helps EV charging project developers when deciding on project locations. Without adoption of AB1236, developers can face inconsistent permitting, plan review requirements and timelines.

Cities and EV project developers also need to be aware of CALGreen, California’s state green building code which sets requirements for installing EV ready infrastructure in new residential and non-residential buildings. EV ready means that buildings must install the electrical infrastructure from the building’s electric panels to specific designated EV parking stalls. As of January 1, 2020, CALGreen requires EV ready infrastructure in a minimum of 10% of parking spaces in multi-family buildings and new commercial properties. There are also requirements for single family homes. Cities can elect to require builders higher than 10% if they choose.

## Recommendation: Take Action

It is important for cities to not only plan for EV infrastructure but to also take action to develop EV infrastructure. One option is for cities to buy level 2 EV chargers, have them installed and own and operate the units. There are rebates available for cities in the form of state rebates and also from local electric utilities. Today, most EV chargers are built as “smart” chargers and can be programmed to set rates to cover electricity costs. Buying chargers and owning and operating the units gives cities the most flexibility in terms of commitment as project developers typically

require a longer-term contract so a city must choose to essentially “lease” its land and parking spaces. Additionally, by owning and operating the charging units, a city would be eligible for low carbon fuel standards (LCFS).

If cities don't have a budget or aren't interested in for EV infrastructure, there are existing EV charging infrastructure project funding sources and partners like Electrify America, Tesla, EVgo, Chargepoint, and others. Cities typically provide parking stalls and space for the charging equipment and in return, companies install equipment at its cost, pay electricity costs as well as operating and maintaining the equipment. As part of VW's settlement with the state of California, Electrify America is required to install \$800 million of EV infrastructure through 2028, 35% of which go towards disadvantaged communities. Tesla also has project funding for its Supercharger network and has built projects with the collaboration of multiple California cities including the City of Pasadena, Palm Springs, and Riverside.

One project idea is to convert city street lights into lights with EV chargers. The City of Los Angeles has installed over 400 EV streetlight with the intention of offering more charging options for EV drivers who don't have access to home charging. Along the same lines, another option is to create designated curbside EV charging parking which helps EV drivers that live in apartment buildings that don't have EV chargers. The City of Santa Monica worked with EV charger manufacturer Chargepoint to install a few curbside chargers that also have a convenient reservation system.

Adopting AB1236 is a no-brainer for cities. Project developers are often anxious to get projects built and unfortunately have faced major delays and overall inconsistencies with city permitting. AB1236 looks to alleviate delays and get EV infrastructure projects going. The decision to own and operate EV chargers is a more difficult one and requires more in-depth analysis and budget considerations. A good way to get started is to own and operate some level 2 chargers while also contract with 3<sup>rd</sup> party developers for level 3 fast chargers. Level 2 chargers are cheaper, easier to install, and typically don't require major utility upgrades while level 3 chargers typically require more equipment and a lot more power (usually as a new electrical service) from the utility. It's important to get started as cities can play a vital role in helping to ease the transition and spur the adoption of EV's.

## City of Los Angeles example

In April of 2019, Mayor Garcetti and the City of Los Angeles released its Green New Deal plan which focuses on environmental justice, equity, renewable energy, local water, energy efficiency, housing, mobility and public transit, zero emission vehicles, waste reduction and green jobs. LA's Green New Deal in collaboration with the city's municipal utility, the Los Angeles Department of Water and Power (LADWP) has created policy infrastructure that clearly supports the development of EV charging infrastructure. The plan calls for LA Metro and LA Department of Transportation (LADOT) bus lines to be 100% electric, 28,000 public EV chargers, and 10,000 emissions free vehicles for the LA Ports by 2030 (LA's Green New Deal, 2019).

## Incentives

CA state rebate: California has a state rebate of \$3,500 for PHEV's and \$4,500 for BEV's. This rebate and has an income cap of \$150,000 for individuals and \$300,000 for joint filers.

Federal tax credit: the federal government provides a tax credit ranging from \$2,500 for PHEV's to \$7,500 for BEV's. If vehicles are leased, the tax credit goes to the manufacturer. Tax credits begin to phase down when a manufacturer has reached 200,000 units sold. For example, Tesla vehicles, and General Motors (makers of the Chevy Bolt and Cadillac ELR), are no longer eligible for the tax credit.

Utility incentives: LADWP's "Charge Up LA" Program offers rebates of up to \$500 for residential customers to offset some of the cost of installing an EV charger, \$5,000 for light-duty EV chargers, \$75,000 for direct current (DC) fast chargers, and up to \$125,000 per charging station for medium and heavy-duty EV's.

SoCal Edison: up to \$1,000 for eligible BEV's.

## Role of Utilities

Utilities obviously play a big part in the transition to transportation electrification. However, are utilities prepared for this massive shift to EV's? One major challenge for utilities related to EV's

is going to be its ability to provide power where it is needed, especially to serve EV fleets such as city and transit agency's transition to electric buses. Utilities can proactively help cities by identifying locations where there is local electrical circuit capacity while they are also planning and implementing needed grid upgrades. It is very likely that utilities and the private sector are going to need to expand the use of micro grids to provide electricity where it is needed if existing utility infrastructure is not able to provide adequate power. "As businesses, municipalities and port authorities evolve their infrastructure and achieve their electrification goals, micro grids provide flexibility in terms of power and cost savings that a conventional connection to the distribution grid may not" (GTM, 2019). Without rapid upgrades by the utilities and an expansion of micro-grids, utilities stand to lose business as third-party energy providers are ready to integrate micro grids into their EV fleet infrastructure projects to provide power where it is needed. Utilities can also structure new rate plans, rebates, and promotions to further ease the transition to EV's.

## Conclusion

The EVRP attempts to give California cities the necessary information to expand EV infrastructure. California cities will play a vital role in the transition to zero emission vehicles through adopting policy for the advancement of EV's and deploying EV infrastructure. Whether own and operate EV chargers, having third parties develop EV projects, or streamline permitting, the tools are available and California needs it cities to act now on EV infrastructure expansion.

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